# PROCESS FOR IDENTIFICATION OF STRATEGIC HABITAT AREA S
## INFORMATION PAPER
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## I.      ISSUE

Whether modifications are needed to the identification process for Strategic Habitat Areas.

## II.     ORIGINATION

In 2005, the NC Coastal Habitat Protection Plan was approved.  The Fishery Reform Act (G.S. 143B-279.8) mandates implementation of the plan recommendations.  Recommendation 2.1 of the CHPP is to "Identify, designate, and protect Strategic Habitat Areas".

## III.    BACKGROUND

Strategic Habitat Areas (SHAs) are defined as:

*"specific locations of individual <u>fish habitats</u> or systems of habitats that have been identified to provide <u>exceptional</u> habitat functions or that are <u>particularly at risk</u> due to <u>imminent threats, vulnerability, or rarity</u>".*

Identification of a subset of priority habitat areas for focused protection is necessary when attempting to balance resource protection with socio-economic uses (i.e., water-dependent development, boating).   For fishery management purposes, habitat evaluations typically involve assessing habitat condition using measures of biological diversity, integrity, and/or site-specific productivity (Hartwell 1998).  Studies have shown that local fish population density can be a meaningful indicator of habitat value (Kramer et al. 1997).  Habitat areas that result in relatively high net export of organisms (i.e., spawning or nursery areas) are considered strategic areas to protect due to their high contribution to fishery stocks.  This is how MFC has traditionally determined areas for ecological designation.  Because this information requires extensive sampling, and adequate fish data may not be available, GIS data and site-selection software has been used as an alternative method to identify a subset of high quality areas that will maintain the diversity of habitats, species, and ecological functions found within the overall ecosystem (Noss 1987; Ward et al.1999).  The recommended subset of habitat needed for conservation has ranged from 10 to 70 percent, depending on specific purpose, with 20-30 percent often considered adequate for protecting valuable and/or vulnerable areas (NRC 2001).  Ward et al 1999 found that species level surrogates worked best when designing networks that are limited to protecting only a small proportion of area (~10%) whereas when protection levels could include a larger proportion (~ 40%), using habitats as surrogates provided better representation of all taxa across the dataset.   Past assessments have used site-selection software as a decision support tool, providing a first approximation to assist in determining priority areas.  In these assessments, final site selection incorporated expert scientific knowledge and other factors to help overcome information gaps and consider socio-economic factors that were not included in the computer program.

This type of process has been used for selection of Marine Protected Areas (regulatory) and for regional conservation assessments (primarily non-regulatory).  Ecoregional assessments have been conducted in 45 of 81 ecoregions of the United States (Beck et al. 2000) by nonprofit organizations such as The Nature Conservancy (TNC), marine research institutes such as Scripps Institute of Oceanography, federal agencies such as NOAA, and state agencies such as the Washington Department of Fish and Wildlife.  One such assessment in the Puget Sound region of Washington resulted in successful establishment of a network of priority areas.  The identified areas were used to guide planning efforts, shoreline and shellfish restoration initiatives, and land acquisition of priority areas, as well as initiate efforts to protect priority shorelines through strengthened policies addressing shoreline hardening, invasive species and vegetated shoreline buffers (Z. Ferdana, TNC, pers. com. 2006).

MFC designated Primary Nursery Areas have been described as an example of a SHA in concept since they represent a subset of shallow estuarine tidal creeks that are exceptional due to their high productivity as a nursery area. However PNAs are protecting one function – nursery for estuarine dependent winter spawned species. A network of protected SHAs could provide habitat connections and functions throughout North Carolina's coastal waters, theoretically ensuring that the complex life history needs of priority fisheries species are met.

In 2005, following approval of the NC Coastal Habitat Protection Plan (CHPP), each DENR division drafted CHPP Implementation Plans, which are updated on a biannual basis. The Marine Fisheries Commission approves of DMF's implementation plans, and the CHPP Steering Committee approves of all division and DENR implementation plans. A 2005 implementation action for the Division of Marine Fisheries was to establish a process to identify and designate Strategic Habitat Areas (SHAs). In 2006, through the assistance of an MFC Advisory Committee, a method was established to identify SHAs (Deaton et al. 2006). Development of the process took 16 months; meeting approximately bimonthly with 12 appointed committee members.

The guidance document describing the SHA identification process conceptually depicts SHAs as areas shown to be providing high ecological function (represented by co-occurrence of relatively unaltered targets) that have a low to moderate amount of alteration (Table 1). The extent of alteration or risk (due to rarity, vulnerability, or imminent threat) will affect the type of management actions needed for an individual SHA. The final process developed by the committee for identification of SHAs involves two general steps (Figure 1). In the first step, fisheries, habitats and issues of concern within the region are identified, and spatially delineated habitats, as well as land and water based alterations within a region (four regions in NC) are assimilated into a GIS database. The targets for protection are at a minimum, habitats, but can also include areas of known fish aggregations representing ecological functions (such as important spawning sites)(Figure 1). The proportion of each targeted resource to be included in the final network (representation levels) is decided upon and a site selection program (MARXAN) is used to identify a recommended subset of areas that meet the representation levels for each target with a minimal amount of total alteration, in the smallest area possible. Some major assumptions underpinning the first stage of the process are: (1) that the information provided in the GIS data layers is accurate, (2) subjectively determined representation levels are sufficient to sustain ecosystem functions, (3) that inclusion and weighting of alteration data accurately represents the influence on habitat condition.

**Table 1.** Relationship among ecological function, alteration (risk) level, SHA designation and potential management measures needed.

| | | Risk/Alteration Level** | |
|---|---|---|---|
| | | **Lower** | **Higher** |
| **Ecological function *** | **High** | MEASURES TO CONSERVE AND PROTECT<br><br>SELECT AS "EXCEPTIONAL" SHA | ADDITIONAL MEASURES TO PROTECT AND ENHANCE<br><br>SELECT AS "AT RISK" SHA |
| | **Low** | MAINTAIN, RESTORE –<br>USE EXISTING PROTECTIONS, EVALUATE FOR RESTORATION<br><br>CURRENTLY NOT SELECTED AS A CANDIDATE SHA | |

\* Represented by co-occurrence of relatively unaltered natural resource targets in an area
\*\* Determined by alteration factors

In the second step of the process, SHA selections are verified and modified as necessary by a regional expert panel (SHA Advisory Committee) using known biological data, ecological/regulatory designations, or specific knowledge of a site. The SHA Advisory Committees for each region consist of environmental professionals (resource managers, academics, and NGOs) with a wide scope of expertise in fisheries, habitats, water quality, and ecology. The committee reviews each selected area and makes modifications as needed based on several

criteria: 1) size, shape, and proximity of polygons, 2) presence and condition of targets based on selection frequency and alteration scores, 3) how close the selected target was to the preselected representation levels, 4) rarity or vulnerability of the habitats, 5) fish data and 6) supporting ecological designations. These specific criteria were developed during the Region 1 analysis and are not specifically listed in the guidance document.
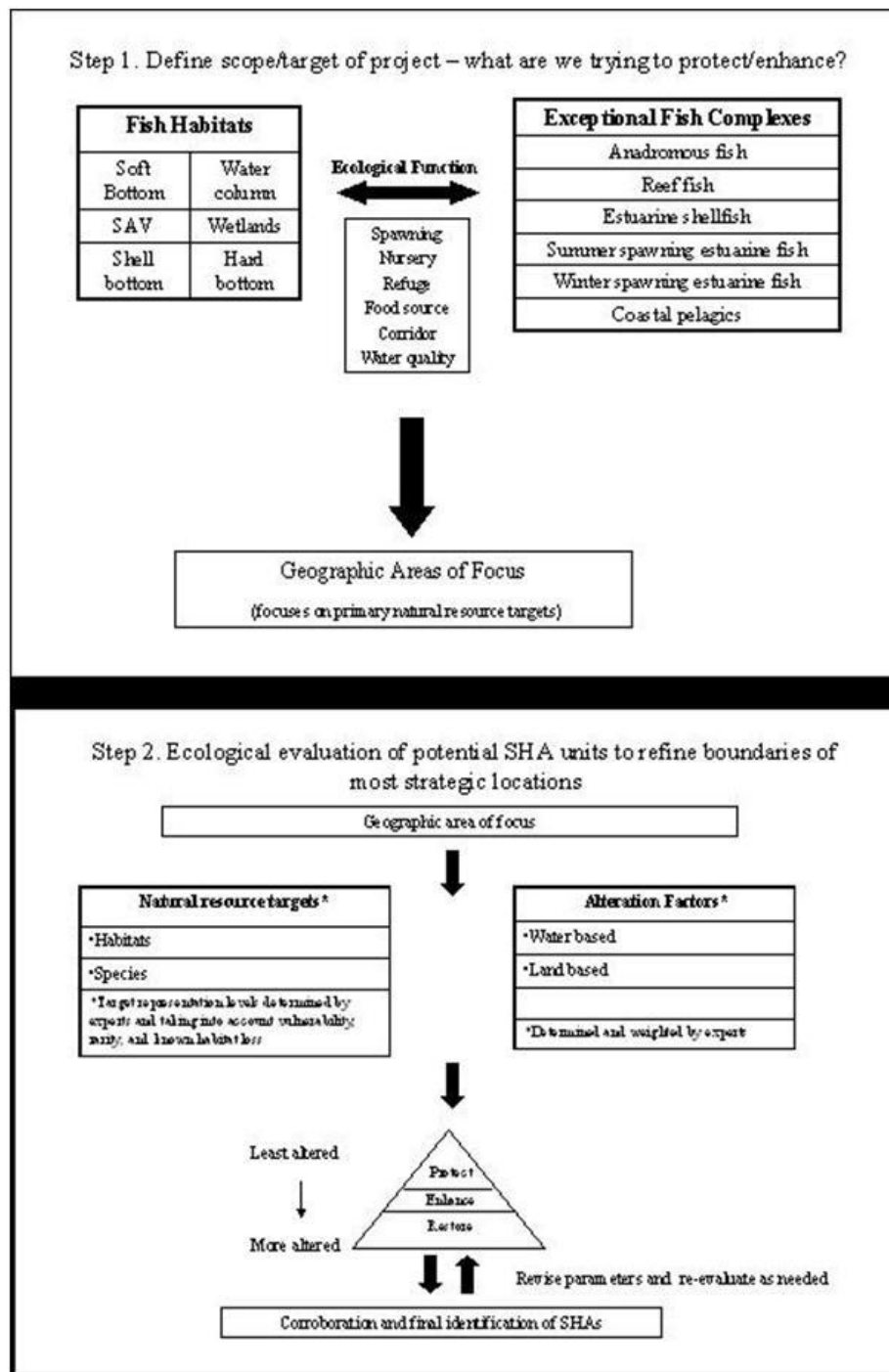
**Figure 1.** Template for SHA identification process.

The specific steps outlined in the guidance document for each advisory committee are:

Data preparation

1.  The DMF determines the geographic area of focus based on fishery or habitat concerns of the MFC, using Figure 1, Step 1.

2.  Preliminary input is gathered from appropriate scientific experts and resource managers on (1) potentially important areas within the geographic area of focus for SHA consideration, (2) specific recommendations regarding data to include in analyses, and (3) weightings to apply to natural resource targets and alteration factors. This would be done at a SHA scientific data workshop to which a panel of regional expert would be invited. A presentation explaining the technique to be used would be needed.

3.  Potential criteria (including natural resource targets and alteration factors) identified by the SHA regional expert panel or workshop attendees are selected and compiled in geospatial format and initial target representation levels and alteration factor weightings are determined and justified.

Ecological Evaluation

4.  DMF staff conducts preliminary ecological assessment of the natural resource targets using the SHA template (Figure 1, Step 2) and a GIS database to assess and corroborate site selection (refer to report for further specifics). MARXAN or other equivalent scientific site selection methods (e.g. VISTA, Arcview ModelBuilder, or customized mathematical routine) that assign quantitative value to natural resource targets and alteration factors are used and documented. Several outputs using various specifications should be compiled for review and discussion.

5.  DMF staff and regional expert panels use "computer selected" areas as a starting point and first approximation. Final identification as a SHA takes into account information gaps and limitations of the preliminary assessment. The preliminary results are reviewed and corroborated with existing habitat condition, supporting fish data, existing ecological designations, known occurrences of rare species or additional local information not captured in the computer output. Remaining gaps will be filled by using professional knowledge provided by expert scientific review, and considering socio-economic factors. Results are modified as needed and possibly extended to areas without fish data. However, exceptional habitat condition by itself is sufficient to support designation.[1]

6.  A post-analysis workshop is held to discuss the expert-modified areas, identify data gaps and needs and make quantitative and qualitative refinements to the areas identified as SHAs based on best professional knowledge and socio-economic factors. This second workshop includes the same scientists as the first workshop, but may include additional people with special information to contribute, such as fishermen, foresters, farmers, agricultural extension agents, local government representatives or other knowledgeable persons.

Nomination and Designation

7.  A written report is completed for each SHA analysis, documenting the natural resource targets and alteration factors used, and the justification for the representation levels, factor weightings, and

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[1] Since fish sampling design was not created for the purpose of evaluating habitat quality, but to estimate viability of a particular species population, all habitat areas are not sampled and the information collected may not adequately evaluate the quality of habitats. Where data exist however, they can be used to corroborate the quality of an area.

modifications to the "computer selected" SHAs. (Appendix B represents an example report for a test case analysis using the Bogue-Core Sound region.)

8.  The report is made available for review by the public, MFC and other scientists with experience in assessment techniques, specific habitats, estuarine processes, fish functional groups and other relevant expertise. The report specifies whether areas were selected for protection, enhancement or restoration, or some combination of those intentions.

9.  Public input is received on (a) proposed designations and (b) potential regulatory and non-regulatory management actions needed for the selected SHAs (specific protection, enhancement or restoration). The CHPP Steering Committee (existing committee consisting of two commissioners each from the EMC, CRC and MFC) provides information to their commissions to inform them of the process and to gain support for the designations.

10. The DMF staff makes changes in designations based on the scientific workshop and public meetings, and final SHA areas are delineated within coastal regions and recommended for designation by MFC or WRC.

11.  Final public comment on the designations is received.

12. The MFC and WRC designate SHAs in rule with commitment to work toward Department-wide implementation of needed rules and enforcement of applicable rules.

Implementation

13. Management actions needed for proposed SHAs are determined by the SHA Management Committee and approved by the CHPP Steering Committee. The SHA Management Committee (to be established by MFC and Fisheries Director) includes two representatives from the SHA Committee to ensure that the scientific intent of the designation is met.

14. The designated SHAs are re-evaluated periodically to determine condition and modify management strategies accordingly. (If a site has deteriorated from "exceptional" to "at risk," management strategy shifts from primarily protection to include restoration.)

In 2008, with the assistance of the SHA Region 1 Advisory Committee, SHAs were identified in the Albemarle region and were approved by the CHPP Steering Committee and the MFC (Figure 2). The identification process for Region 1 took one year. At the beginning of the Region 1 SHA analysis, river herring was noted as a major concern. In addition, SAV was considered a high priority due to its rarity in the region, vulnerability, and value to river herring and other species. Obstructions were noted as a significant threat for anadromous species. For this assessment, only habitats were used as targets. Anadromous Fish Spawning Areas (AFSAs) were used as corroboration, rather than a target, due to limitations of the collected data. Fish data from Program 100 were also used as corroboration rather than a target due to limitations of sampling coverage. MARXAN analysis selected approximately 20% of the overall habitat area. During corroboration, the committee verified the SHAs and made minor modifications based on the criteria provided to them. However, one significant deviation was to include all of the Chowan and Roanoke rivers due to their regional significance for depleted river herring stocks, as well as other anadromous species. While MARXAN selected a large proportion of these rivers, the committee decided to select the entire Roanoke and Chowan river systems for spawning migration connectivity. After corroboration, the final results included 490,315 acres (23% of polygon areas) and 3,052 linear miles (17% of line features, including over 40% of shoreline features) of the total habitat area as SHAs. Approximately 73% of Anadromous Fish Spawning Areas in the SHA Region were selected as SHAs. While the final percent of overall habitat selected after expert modification (23%) was similar to the overall percent selected by the computer (20%), the

percentages of specific selected habitat targets varied from the pre-designated representation levels (all met or exceeded).  The target percentage of 20-30% provided some constraints on the area nominated, though the percentage of nominated shoreline feature exceeded the target by 10%.

One concern during corroboration was the uncertainty of whether selected areas were of higher quality than similar unselected adjacent areas, or if the difference in selection was simply due to the arbitrary selection by MARXAN or site specific gaps in expert knowledge.   Due to the uncertainty of the GIS based process, need for field validation, and necessary site-specific management actions, the committee decided that no regulations specific to Region 1 SHAs should be established.  Maps and information layers produced during the assessment were provided to conservation organizations for non-regulatory use.  It was agreed that regulatory changes could be implemented later, if needed, and after selected SHA boundaries were verified and refined with field data.  Different SHAs would need to be designated separately according to the specific management actions needed.

In 2010, DMF staff and a region specific SHA advisory committee began the Region 2 analysis (Pamlico Sound and tributaries).  The committee has met six times since April 2010, has completed the MARXAN results, and gotten through more than half of the corroboration stage.  Many of the same difficulties and questions have arisen regarding percent of area to select, connectivity, and use of ecological designations.   The Pamlico Sound region includes the largest state-wide area of high salinity grass beds behind the Outer Banks.  The committee decided to add in unselected areas of SAV behind the Outer Banks due to information from committee participants  that fish use and biological condition of the grass beds was fairly uniform and some of the areas not selected might have been due to lack of fish data.  The committee also decided to add unselected portions of wetland shoreline edge along western Pamlico Sound south to Long Point Shoal because the entire area was considered to be a hot spot for blue crab and other species recruitment and was relatively unaltered but at risk due to sea level rise.  These changes, in combination with 100% of PNAs being selected, resulted in almost the entire western Pamlico Sound shoreline being selected.  When discussing river selections, WRC staff suggested all of the upper Neuse mainstem be selected for connectivity and importance to anadromous fish.  They noted that those areas should be prioritized over some other smaller tributaries utilized primarily by resident species (i.e., largemouth bass and bream).  Staff was concerned that too much of the area was being selected to be considered an exceptional subset of the area and if regulatory changes would be imposed on these areas in the future (Figure 3).  Corroboration has at this point in the process led to an increase in the overall percent selected from 30% by the computer, to 36% after corroboration.  The extent of selected shoreline increased from 53 – 70%.
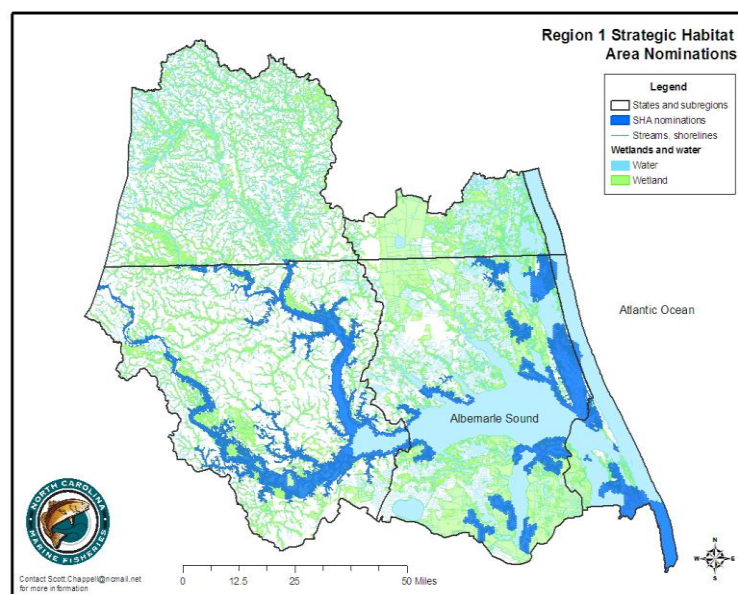
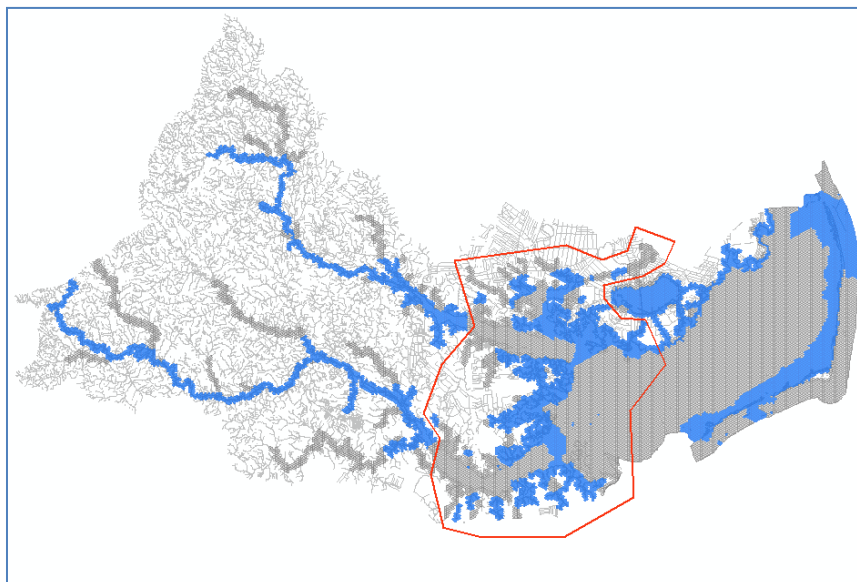Figure 2.  Strategic Habitat Areas in Region 1.



Figure 3.  Map of Region 2 after partial expert modification (phase I).  Note: blue indicates areas selected as SHA, red outline indicates areas we have yet to cover.

## IV.    AUTHORITY

G.S. 143B-279.8

## V.    DISCUSSION

When DENR decided that the CHPP would cover the entire coast in one plan, it was agreed to follow up with CHPP management unit plans.  At first, these were to be done for each individual, coastal draining river basin.  Subsequently, conducting four regional SHA analyses replaced this idea.  Each region consists of several river basins that have overlapping influence, and thus each SHA analysis represents an ecosystem plan.  Each analysis collects detailed information on habitats, fish use, existing protected lands, land use, and presence of habitat threats such as marinas, dredged channels, point source discharges, and land-use changes.

A positive benefit already received from conducting SHA analyses has been the compilation of habitat and alteration information into a GIS database, and modification of that information to be more useful for such assessments.  Data sets previously unavailable from sources other than DENR have been included, such as WRC's coverage of rocky riverine habitat and USACE's coverage of subtidal oyster beds in the lower Neuse River.  Numerous resource agencies and academic institutions have already requested the input data.  The 2009 Sea Grant fellow Tim Ellis was able to run statistical analyses using Program 100 data to examine the relationship between habitat condition as determined by the SHA analysis and fish abundance metrics, and found some positive correlation between increasing alteration and lower abundance of key species. The 2010 Sea Grant fellow Jen Weaver has created a fish target for Region 2 based on Program 195 data and is working on the MARXAN analysis and fish-alteration correlations.

Certain questions regarding the validity of the process continue to be raised during advisory committee meetings. These include:

**Identification of priority fisheries or habitat issues** - In reviewing the guidance document establishing the process, there are two basic premises that may not have been given sufficient attention in the Region 2 analysis:

- To begin identification of SHAs, the process must define the natural resource targets for protection, enhancement, or restoration.

- The process can be driven by concerns for either a fish habitat or fish complex (more than one species that share similar life history traits and are often targeted collectively in one fishery – e.g., anadromous fish complex or reef fish complex).

These two premises emphasize that the SHA identification process should be driven by concerns for habitat or fisheries, and targets should include those in need of protection, enhancement, or restoration. In Region 1, the committee recognized up front that this region is significant due to its importance for multiple anadromous fish species. Protection of anadromous fish spawning habitat and concerns for the river herring fishery in particular were evident from the resulting SHAs. Improvements to the process should include greater discussion of and focus on the significant fisheries habitat issues (fish and habitat resources present, threats to their sustainability) to guide selection of natural resource targets and representation levels. However, this does not preclude the need to develop a comprehensive library of natural resource targets, alteration factors, and corroborating information for a region. The number and representation level of targets could be limited to the areas supporting the identified priority fisheries and habitats, rather than selecting a portion of every habitat type in the region. Habitat types that are abundant, resilient, or not strongly connected to fisheries of concern would not need to be included as a target. For example, most types of deep soft bottom could be considered for exclusion as a target since that habitat is resilient, dynamic, relatively abundant and increasing as structured habitats decrease, except where they overlap with significant functional areas (i.e., Anadromous Fish Spawning Areas). In addition, wetland targets should be limited to include only the types associated with priority fisheries.

**Selecting a subset of habitats** – Selecting only a percent of a target and retaining that approximate percent after corroboration has been the greatest challenge of this process. There is underlying concern that selecting only part of a habitat implies that one area of a habitat is more valuable than another (i.e. this area of SAV is more important than that area of SAV). However, all habitat areas are important for some species at various life stages and for different reasons. The concern for picking too much area and lack of priority fisheries habitats created a problem with putting constraints on the area selected when nearly all areas were considered important for one species life-stage or another. Another concern is that the representation levels to select for each target are subjectively chosen, although based on best professional judgment of rarity, vulnerability/sensitivity, and/or historic losses. Because the advisory committee is composed of experts in various ecological fields, there is also a tendency for members to think that their habitat specialty is the most strategic, and the associated habitat should have high representation levels. Furthermore, there is uncertainty that the inputs to MARXAN will select an ecologically correct subset of habitat. Because of these concerns, the committees have struggled with sticking to the original set representation levels and tend to add substantial areas during the corroboration phase.

It is important to remember that this process is based on the concept of selecting a subset of high quality habitats, with little to moderate alteration, that are most strategically located to ensure at least a minimum amount of "stepping stones" are maintained throughout the system to support various life stages and species as they migrate in and out of the estuary. Some view this as conflicting with the concept of connectivity, particularly with river corridors and wetland edges, since movement through the system is critical for migratory species throughout their life cycle. Each committee has had a lot of difficulty in leaving gaps between selections. This issue has to be resolved before representation levels can be set and reasonably adhered to. More detailed discussion is needed on the objectives for SHA nominations. If the committee did not want to be restricted to specific target percents, the process could be modified to not use MARXAN and instead base selections solely on alteration scores and expert

opinion.  Alternatively, the committee could continue to use MARXAN as a starting point, modify through corroboration as needed, and not be concerned about constraining the proportions selected to 20-30%.

**GIS based analysis** - In the past, DMF has relied on fisheries data (presence, abundance, diversity of fish), rather than presence of habitat as the basis for regulatory designations.   There is no single established method to evaluate habitat condition or function.  The assumption is if the habitat is present, it is providing ecosystem services, and if degraded, the value of the services declines.  In addition, the analysis is based on GIS data layers of the habitats and alterations spanning a variable time period from 1981-2010.  The accuracy of GIS data is variable and could contain substantial inaccuracies.  The SHAs identified for Region 1 have not been verified with field data that could provide support for their nomination.

**Unknown regulatory ramifications for designating SHAs** – There are concerns from the committee and staff about deciding how much of a habitat to select without knowing what protections/regulatory restrictions could be applied to them in the future.  If SHAs were strictly used for land conservation and non-regulatory efforts, it would be easy to select large amounts of habitat. But if meaningful regulatory changes are to be applied to SHAs, it would be difficult to get approval and implement regulatory changes if too large an area is selected.  When PNAs were established, DMF knew that they planned to have restrictions on trawling.  When AFSAs were designated, there was no plan for regulatory restrictions, but they were designated by a quantifiable metric – evidence of spawning activity somewhere upstream.  More detailed discussion on what the habitat related problem is and potential management needs would be helpful in clarifying where and how much area to select.  The process could be modified to determine regulatory changes that would be moved forward once SHA designation had occurred.  However, considering regulatory measures for potential designations makes it increasingly difficult to select science based priority areas without political considerations.   Because SHA management actions will vary from site to site, it would also be difficult to determine needed management actions before specific sites are identified.  In addition, considering regulatory changes in the process of identifying the overall SHA network is inconsistent with the SHA guidance document.

**Inclusion of existing ecological designations -** There has been disagreement on whether existing ecological designations should be included as a target. In the guidance document it states that habitats and ecological functions (Figure 1) can be considered targets and that ecological designations can be used as corroborating information since designations have various levels of ecological representation and political/jurisdictional influences.  In the Region 2 analysis there was interest in including designated PNAs as targets because they were developed through intense sampling and scientifically based designation of productive nursery areas and could help guide the selection of other SHAs.  Of the known existing ecological designations, PNAs, could be used a natural resource targets if estuarine nursery areas were considered a priority for additional protection.   However there were concerns expressed by some that if PNAs were used as a target, either all or none of them should be selected as SHAs so that it couldn't be misinterpreted that some PNAs are better than others.  Considering that the process of SHA designation is based on the selection of habitats, it may not be necessary to use existing fishery based ecological designations as targets in site selection analysis, since these are already identified areas.  Use of PNAs in the analysis (during MARXAN runs or corroboration) should be considered separately for each region due to their influence on and connectivity to other targets.  In Region 2 PNAs meet the definition of a SHA but were previously identified and designated through other processes.

Whereas some of the issues described above can be attributed to the process itself, others can be attributed to communication with the SHA advisory committee and the need for additional emphasis and consistency on the existing process.  These include:

- Better discussion and identification of priority fish, fishery or habitat issues of the region
- Better explanation of the theory behind selecting a subset of functional areas and how that addresses connectivity

- More careful consideration of targets and representation levels prior to running MARXAN
- Additional clarification in the guidance document on criteria to base SHA modifications
- Consistent application of modification criteria during corroboration
- Better clarification to the committee on use of ecological designations; quality of the supporting data and how well the designation corresponds to the distribution of an ecological function.

## VI.    RECOMMENDATION

An information paper was presented to DMF's Management Review Team (MRT) to get additional input on
1) Whether changes are needed to the SHA identification process
2) What fisheries they consider a high priority and of traditional importance for Pamlico Sound and tributaries (Pamlico and Neuse river systems)?  In other words if we are to focus on selecting strategic habitat areas to protect, what species are of traditional or key importance to the area.  We would then focus identifying habitat areas of particular importance to those species.
3) What the main anthropogenic issues to habitats in this region

The MRT provided some guidance for the SHA committee.  It was noted that:
- Each regional analysis should follow the MFC approved process in a consistent manner, although each region will have area specific objectives.
- Potential management actions for identified SHAs must be considered separately and after the SHAs are identified.
- SHAs were meant in concept to be a subset of exceptional sites that are strategically located (those that are most influential for supporting priority species productivity).  The SHA definition also includes high quality areas that are at risk, due to vulnerability, rarity, or imminent threat.  Inclusion of at risk areas however was not intended to include lower functioning or highly degraded areas.
- MARXAN is beneficial by providing an unbiased starting point to begin corroboration on and MARXAN, or a similar spatial planning tool in the future, should continue to be used.
- The percent of targets and overall area to select will vary based on the priorities of the region and diversity of the system, and there is therefore no one set percentage that is correct.
- There shouldn't be different types of SHAs – rather, different types of protections, which are determined separately after designation. However, the suggestion of management actions could be included with the documentation for individual SHAs.
- The SHA process indicates that ecological designations should be used as corroboration, but also notes that SHAs may include areas already protected by other designations.  So the guidance document is not completely clear, and there is therefore flexibility in the process as written and will depend on the region and identified priorities as to whether to use PNAs as targets.  For Region 2, we can consider PNAs as SHA, and include in the MARXAN run for connectivity purposes and adjust through corroboration as needed, or run without PNAs included and acknowledge in the end that they are also SHAs.

After consideration of the information presented and comments from MRT, the information was revised and the following course of action is recommended:

In the spring, habitat staff will initiate field verification of a subset of SHAs in Region 1, as described in the Region 1 SHA report.  This will require confirmation of presence of habitats, alterations, and fish, modification of boundaries if necessary, and determination of likely management actions needed for that site.  Conducting the field verification will help staff validate the condition of the SHAs and determine if more substantial changes are needed to the process.

Concurrently, staff will move forward with the Region 2 analysis. The process will remain as it's currently written, but some clarification will be added regarding criteria to modify SHA selections during corroboration and use of the PNA designation. A step should also be added requiring a meeting with MRT at the onset of a SHA Region analysis to have a DMF position on greatest priorities and issues within that region.

The Region 2 SHA AC meeting should begin by having additional discussion on the theory behind selecting a network of priority areas for protection, and how this relates to connectivity. Staff should communicate priorities of DMF to the committee, **clearly identify goals of the SHA analysis**, and discuss and **identify priority fisheries and habitats**. The committee will use the identified priorities to revisit targets, representation levels, and alteration factors. After that, staff will rerun MARXAN. After reviewing the new results, the committee will conduct corroboration using the specified criteria and priorities, and consistently apply criteria for modification. Once selected, general management actions (enhancement, or restoration) for SHAs can be established using selection frequencies and/or alteration scores and expert knowledge.

MRT identified the following traditionally important priority fisheries, associated habitats, and threats.

Fisheries
Oysters
Blue crab
Shrimp
Southern flounder
Red drum
Speckled seatrout

Important habitats for those species
SAV
Oysters
Upper detrital nursery areas
Good water quality

Primary Threats
Agricultural drainage
Bottom disturbing fishing gear
IBX development → increasing impervious surfaces, increasing wastewater effluent or runoff, decrease in upland buffers
Sea level rise (fringing wetland shoreline at risk)

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